



FCC TEST REPORT

Product Name: Ultra HD Multimedia Conferencing System
Trade Mark: GRANDSTREAM
Model No.: GVC3220
Report Number: 200512001EMC-1
Test Standards: FCC 47 CFR Part 15 Subpart B
FCC ID: YZZGVC3220
Test Result: PASS
Date of Issue: September 27, 2020

Prepared for:

Grandstream Networks, Inc.
126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
16/F, Block A, Building 6, Baoneng Science and Technology Park,
Qingxiang Road No.1, Longhua New District, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by:

Henry Lu
Team Leader

Reviewed by:

Kevin Liang
Assistant Manager

Approved by:

Billy Li
Technical Director

Date:

September 27, 2020

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China
Tel: +86-755-28230888 Fax: +86-755-28230886 E-mail: info@uttlab.com

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Version

Version No.	Date	Description
V1.0	September 27, 2020	Original



Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks, Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA
Manufacturer:	Grandstream Networks, Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Ultra HD Multimedia Conferencing System
Model No.:	GVC3220
Trade Mark:	GRANDSTREAM
DUT Stage:	Production Unit
Rated Voltage:	☒ 100-240V~50/60Hz
Classification of digital devices:	Class B
Highest Internal Frequency:	5825MHz
Sample Received Date:	May 12, 2020
Sample Tested Date:	May 12, 2020 to September 7, 2020

1.2.2 Description of Accessories

Adapter 1	
Model No.:	EA10683ER-480
Input:	100-240 V~50/60 Hz 2.0 A
Output:	48 V $\equiv$ 1.25 A 60W
AC Cable:	1.2 Meter, Unshielded without ferrite
DC Cable:	2.0 Meter, Unshielded with one ferrite
Manufacturer:	EDACPOWER ELECTRONICS CO., LTD.

Adapter 2	
Model No.:	KPL-065S-VI
Input:	100-240 V~50/60 Hz 1.7 A
Output:	48 V $\equiv$ 1.35 A 65W
AC Cable:	1.2 Meter, Unshielded without ferrite
DC Cable:	2.0 Meter, Unshielded with one ferrite
Manufacturer:	Channel Well Technology Co., Ltd

Cable 1	
Connector:	HDMI
Cable Type:	Shielded with two ferrite
Length:	1.5 Meter, Shielded with two ferrite

Cable 2	
Connector:	HDMI
Cable Type:	Shielded with two ferrite
Length:	1.5 Meter, Shielded with two ferrite

Cable 3	
Connector:	HDMI
Cable Type:	Shielded with two ferrite
Length:	5.0 Meter, Shielded with two ferrite

Cable 4	
Connector:	Ethernet Cable
Cable Type:	Unshielded without ferrite
Length:	2.0 Meter, Unshielded without ferrite

Remote control	
Model No.:	GVC3210RMT

Microphone	
Model No.:	GMD1208

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust
USB flash disk	Kingston	DTSE9	N/A	UnionTrust
USB flash disk	Kingston	DTSE9G2	N/A	UnionTrust
SD card	Transcend	microSD	N/A	UnionTrust
Earphone	N/A	QTER01JY	N/A	UnionTrust
Monitor	DELL	P2416Db	N/A	UnionTrust
Monitor	HKC	M216AF	BOG20180003	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
LAN Cable	2	Unshielded without ferrite	1.5 Meter	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.5 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories

CAB identifier: CN0032

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

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1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.2 dB
2	Conducted emission 150KHz-30MHz	±2.7 dB
3	Radiated emission 9KHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	Test Requirement	Test Method	Result
Conducted Emission	FCC 47 CFR Part 15.107	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109	ANSI C63.4-2014	PASS



3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021
☒	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020
☐	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 24, 2019	Nov. 23, 2020
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 16, 2019	Nov. 15, 2020
☒	Preamplifier	HP	8447F	2805A02960	Nov. 16, 2019	Nov. 15, 2020
☐	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	May. 30, 2020	May. 29, 2021
☐	6dB Attenuator	Talent	RA6A5-N-18	18103002	Nov. 24, 2019	Nov. 23, 2020
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Nov. 24, 2019	Nov. 23, 2020
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May. 30, 2020	May. 29, 2021
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 19, 2020	Jun. 18, 2021
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 24, 2019	Nov. 23, 2020
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2019	Nov. 23, 2020
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020
☐	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 24, 2019	Nov. 23, 2020
☒	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	1.120V~60Hz 2.240V~50Hz	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Conducted Emission	23.9	39	99.17	Tripp Jiang
Radiated Emission	25.5	57	100.62	Lucas Ouyang

4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Mode 1: Charging from 120 Vac + Internet (With Ethernet Cable) + USB flash drive (USB3.0) + Mouse(USB2.0) + Line IN (Connect an external Microphone) + Line OUT (Connect an external Speaker) + Camera + HDMI IN+HDMI OUT*2 Mode 2: Charging from 120 Vac + Internet (With Ethernet Cable) + SD card(recording files) + Mouse(USB2.0) + Line IN (Connect an external Microphone) + Line OUT (Connect an external Speaker) + Camera + HDMI IN+HDMI OUT*2 Mode 3: Charging from 240 Vac +Worse from mode 1~2 Mode 4: Worse from mode 1~3 + Adaptor 2
Conducted Emission	Mode 1: Charging from 120 Vac + Internet (With Ethernet Cable) + USB flash drive (USB3.0) + Mouse(USB2.0) + Line IN (Connect an external Microphone) + Line OUT (Connect an external Speaker) + Camera + HDMI IN+HDMI OUT*2 Mode 2: Charging from 120 Vac + Internet (With Ethernet Cable) + SD card(recording files) + Mouse(USB2.0) + Line IN (Connect an external Microphone) + Line OUT (Connect an external Speaker) + Camera + HDMI IN+HDMI OUT*2 Mode 3: Charging from 240 Vac +Worse from mode 1~2(Mode 1) Mode 4: Worse from mode 1~3 + Adaptor 2(Mode 3)
Remark: The above test modes in boldface were the worst cases, only the test data of these modes were reported.	

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz

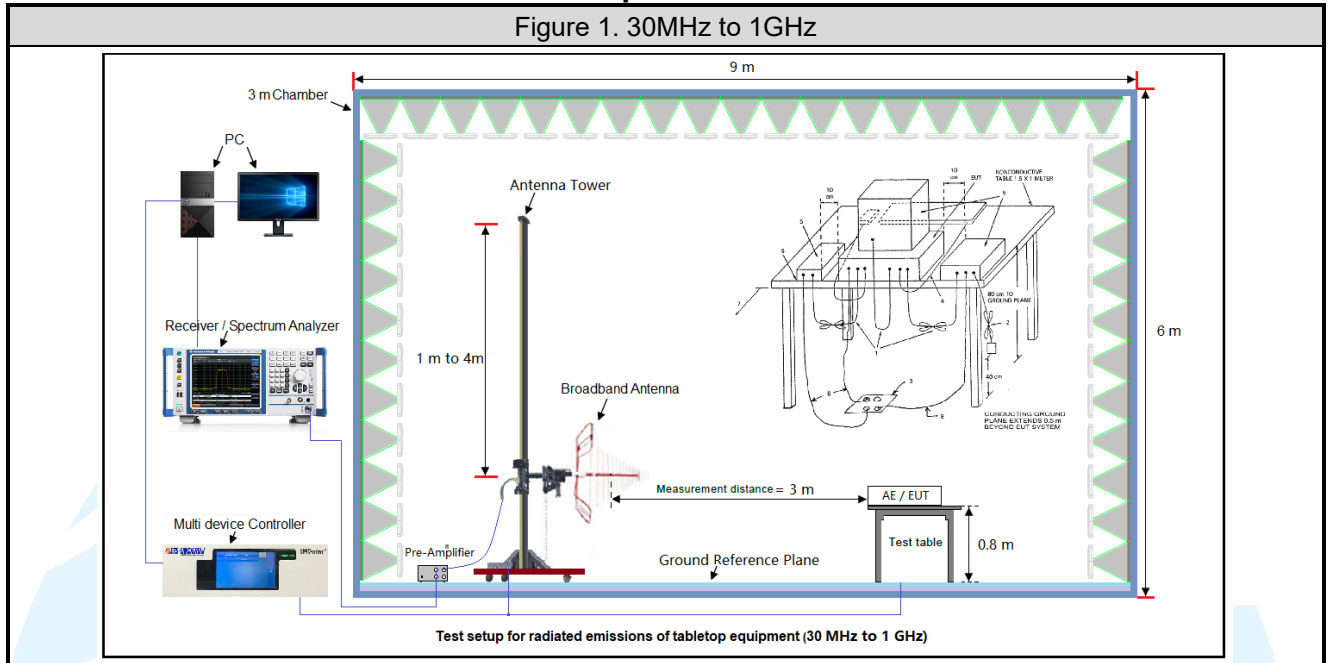
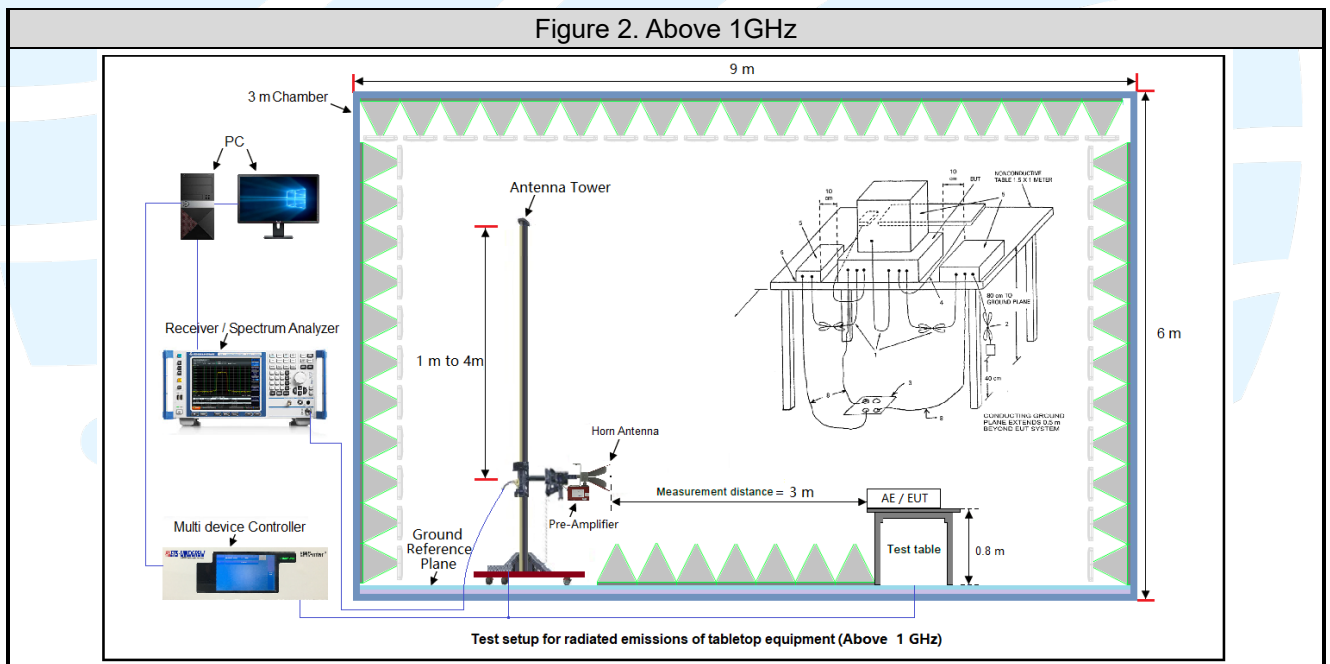
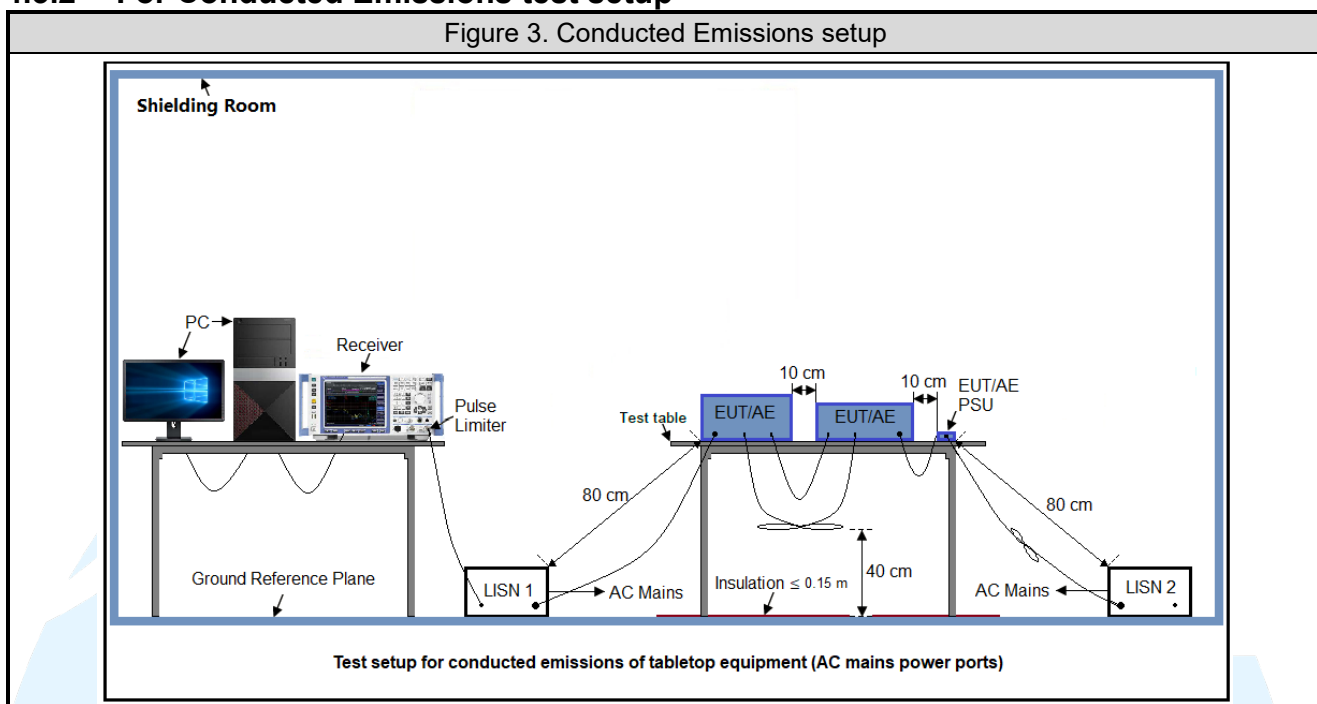


Figure 2. Above 1GHz



4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
3	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
4	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
$30 \leq f \leq 1\,000$	Quasi Peak	120 kHz	300 kHz
$f \geq 1000$	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Limits:

Limits for Class B devices

Frequency (MHz)	limits at 3m (dB μ V/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

- The lower limit shall apply at the transition frequencies.
- Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

- From 30 MHz to 1GHz test procedure as below:

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

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- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

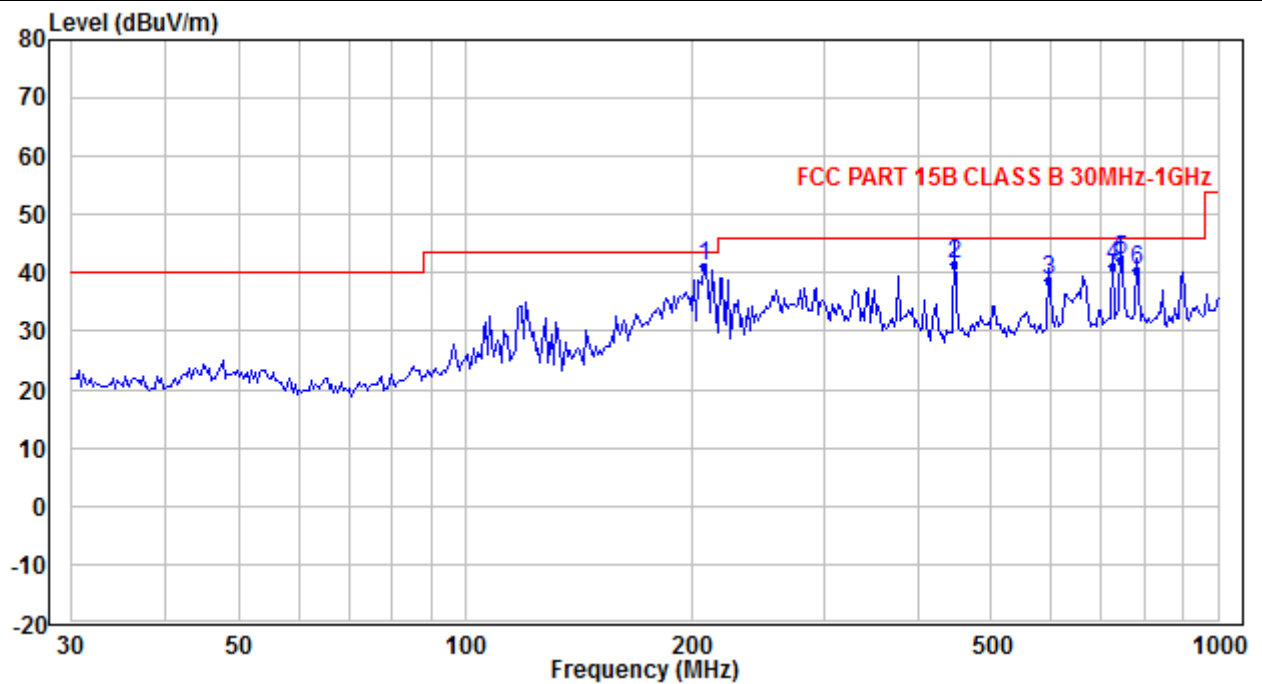
- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- 3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

Below 1GHz(Quasi Peak):
Mode 2
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	207.197	50.45	-9.21	41.24	43.50	-2.26	QP
2	445.693	44.07	-2.43	41.64	46.00	-4.36	QP
3	594.514	38.23	0.59	38.82	46.00	-7.18	QP
4	723.793	37.94	3.08	41.02	46.00	-4.98	QP
5	744.427	39.05	2.98	42.03	46.00	-3.97	QP
6	781.961	36.95	3.53	40.48	46.00	-5.52	QP

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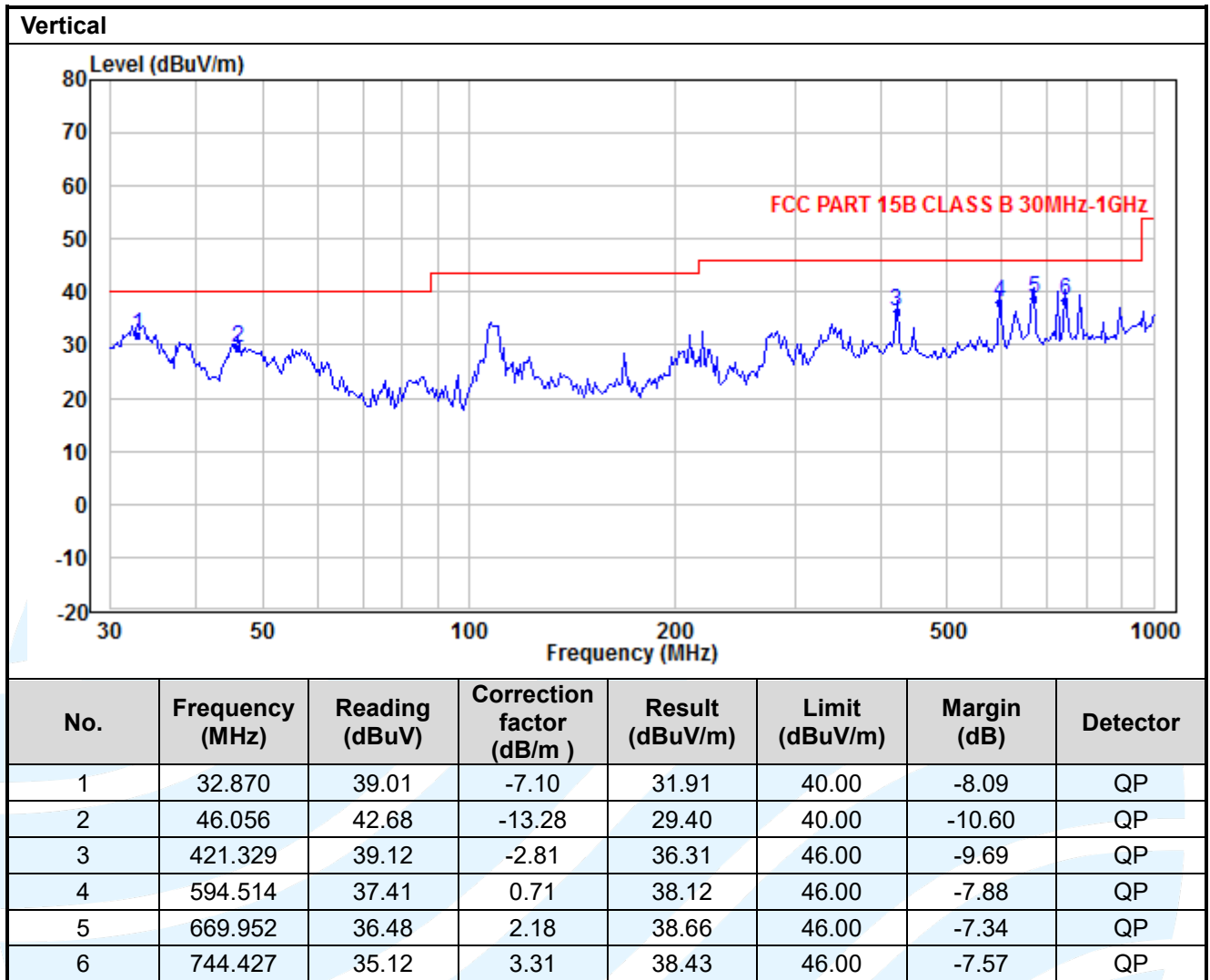
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Fax: +86-755-28230886

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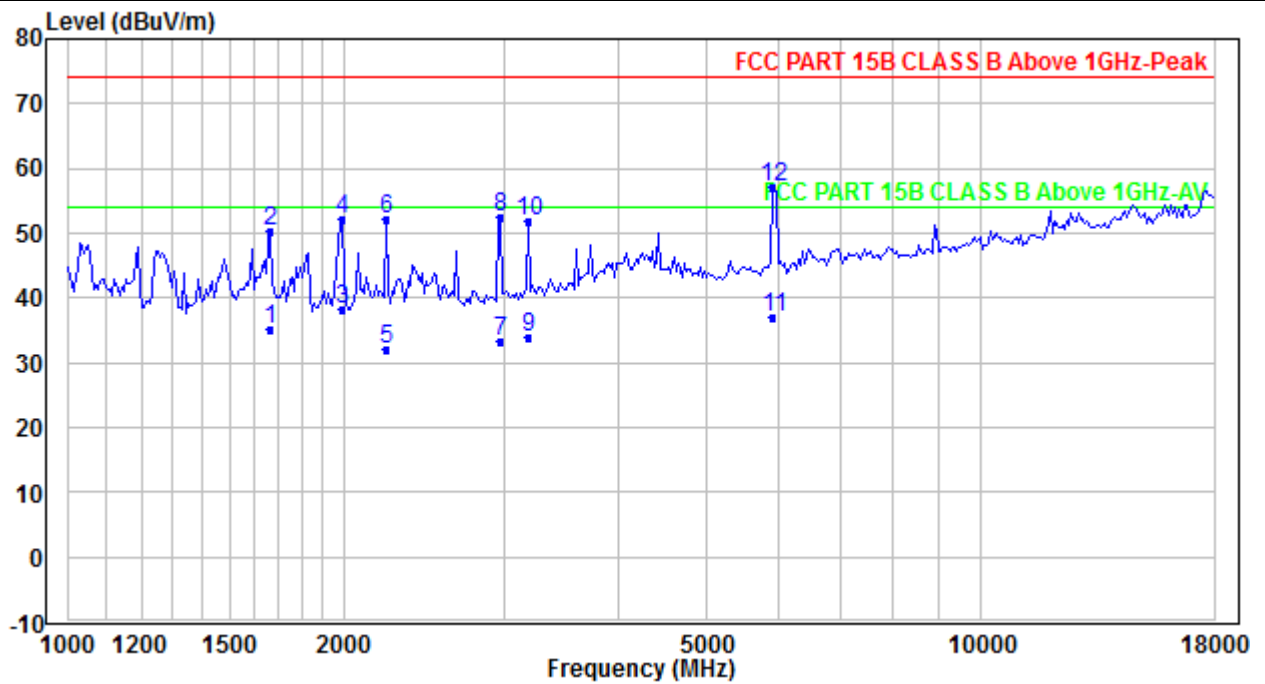
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Above 1GHz(Peak & Average)
Mode 4
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	1664.833	46.83	-11.60	35.23	54.00	-18.77	Average
2	1664.833	61.83	-11.60	50.23	74.00	-23.77	Peak
3	1992.295	48.14	-9.89	38.25	54.00	-15.75	Average
4	1992.295	62.14	-9.89	52.25	74.00	-21.75	Peak
5	2224.075	41.69	-9.62	32.07	54.00	-21.93	Average
6	2224.075	61.69	-9.62	52.07	74.00	-21.93	Peak
7	2971.176	40.79	-7.35	33.44	54.00	-20.56	Average
8	2971.176	59.79	-7.35	52.44	74.00	-21.56	Peak
9	3185.042	40.38	-6.58	33.80	54.00	-20.20	Average
10	3185.042	58.38	-6.58	51.80	74.00	-22.20	Peak
11	5919.457	37.74	-0.69	37.05	54.00	-16.95	Average
12	5919.457	57.74	-0.69	57.05	74.00	-16.95	Peak

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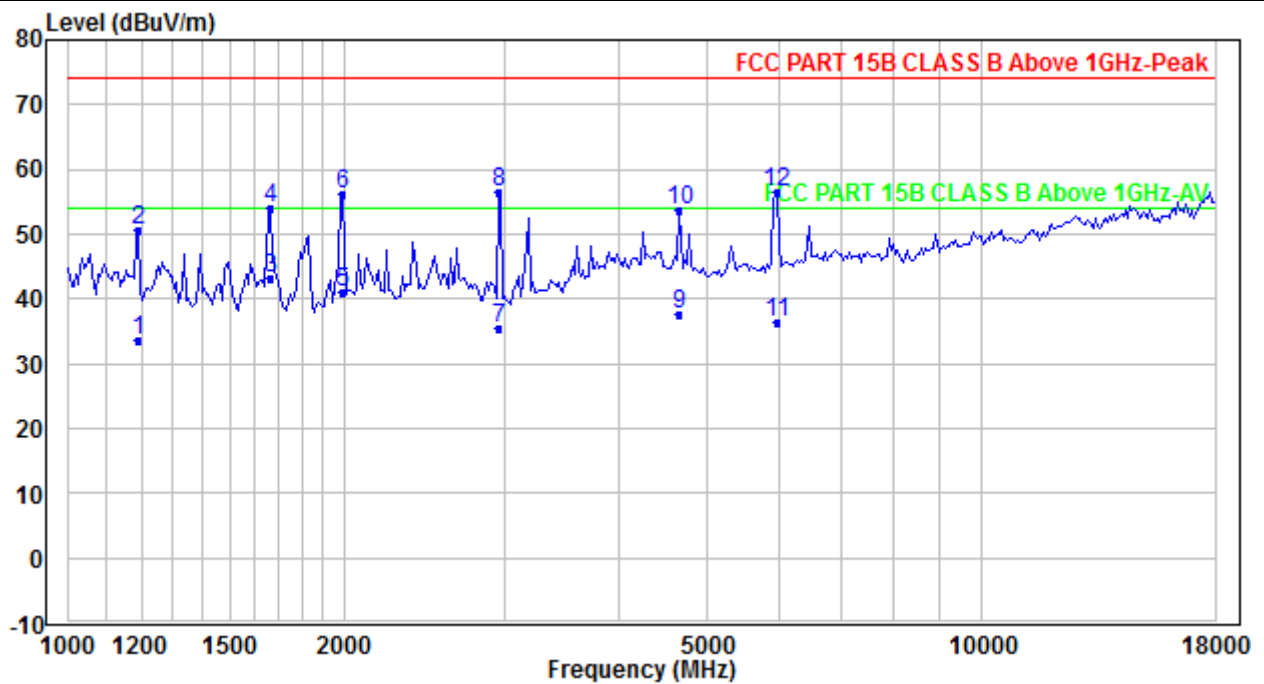
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Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1*	1189.782	45.50	-11.87	33.63	54.00	-20.37	Average
2	1189.782	62.50	-11.87	50.63	74.00	-23.37	Peak
3	1664.833	55.46	-12.36	43.10	54.00	-10.90	Average
4	1664.833	66.46	-12.36	54.10	74.00	-19.90	Peak
5	1992.295	51.53	-10.39	41.14	54.00	-12.86	Average
6	1992.295	66.53	-10.39	56.14	74.00	-17.86	Peak
7	2954.015	43.66	-8.18	35.48	54.00	-18.52	Average
8	2954.015	64.66	-8.18	56.48	74.00	-17.52	Peak
9	4668.133	41.27	-3.50	37.77	54.00	-16.23	Average
10	4668.133	57.27	-3.50	53.77	74.00	-20.23	Peak
11	5953.844	36.67	-0.21	36.46	54.00	-17.54	Average
12	5953.844	56.67	-0.21	56.46	74.00	-17.54	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.
5. For Radiated Emission above 18GHz, there was not any unwanted emission detected.

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6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

- 1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- 2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Equipment Used: Refer to section 3 for details.

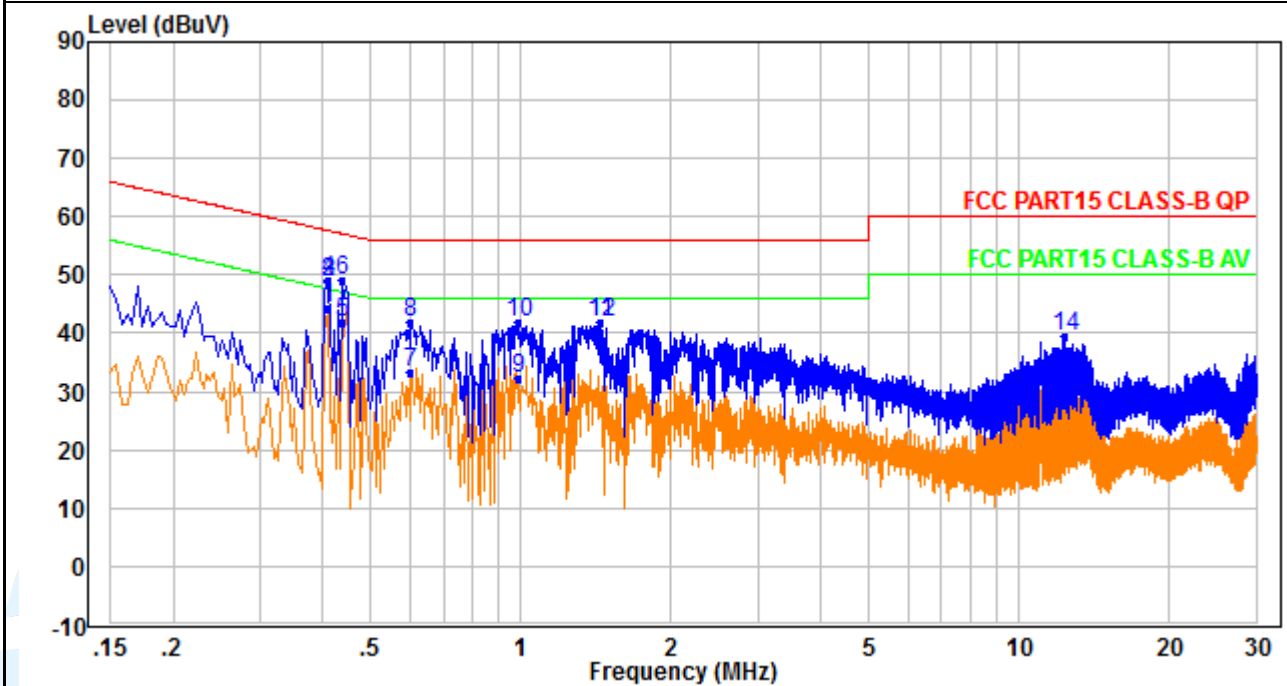
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

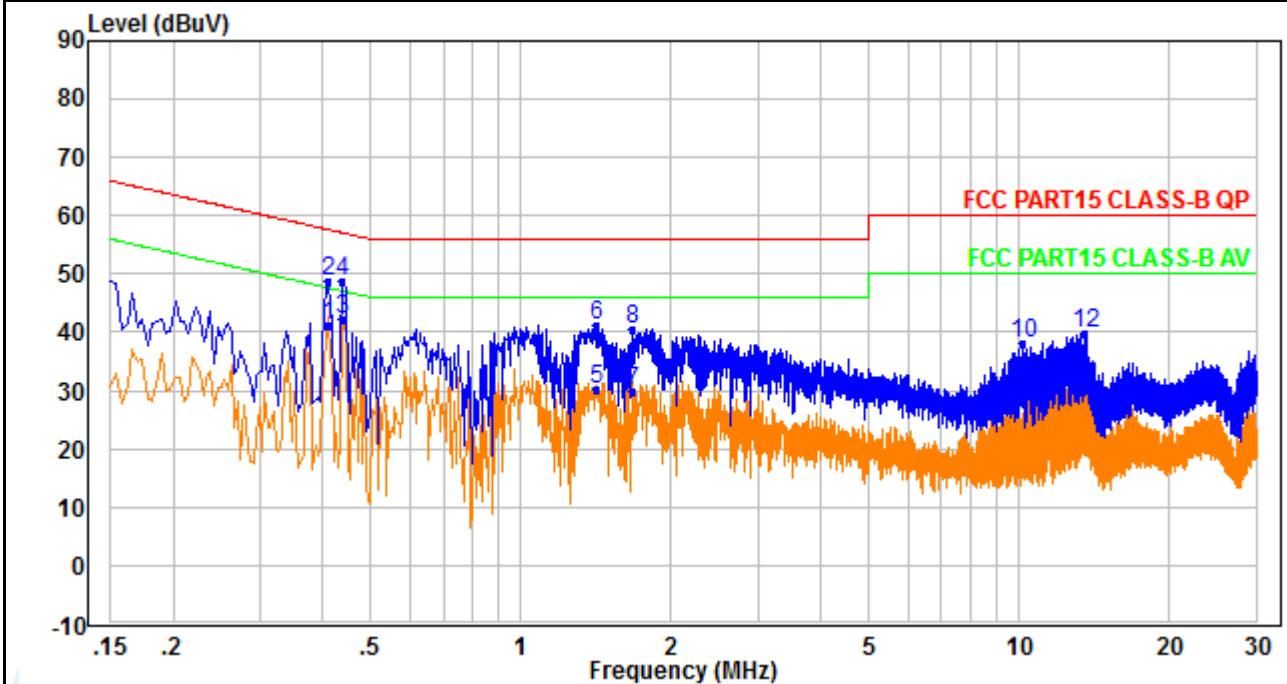
Mode 4

Live Line



No.	Frequency (MHz)	Reading (dBUV)	Correction factor (dB)	Result (dBUV)	Limit (dBUV)	Margin (dB)	Detector
1	0.410	35.00	9.19	44.19	47.65	-3.46	Average
2	0.410	39.62	9.19	48.81	57.65	-8.84	QP
3	0.410	39.62	9.19	48.81	57.65	-8.84	Average
4	0.410	39.99	9.19	49.18	57.65	-8.47	QP
5	0.438	32.61	9.23	41.84	47.10	-5.26	Average
6	0.438	39.96	9.23	49.19	57.10	-7.91	QP
7	0.602	24.04	9.31	33.35	46.00	-12.65	Average
8	0.602	32.49	9.31	41.80	56.00	-14.20	QP
9	0.986	23.03	9.40	32.43	46.00	-13.57	Average
10	0.986	32.44	9.40	41.84	56.00	-14.16	QP
11	1.446	32.23	9.50	41.73	56.00	-14.27	Average
12	1.446	32.23	9.50	41.73	56.00	-14.27	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.410	32.19	9.18	41.37	47.65	-6.28	Average
2	0.410	39.70	9.18	48.88	57.65	-8.77	QP
3	0.438	33.06	9.23	42.29	47.10	-4.81	Average
4	0.438	39.55	9.23	48.78	57.10	-8.32	QP
5	1.418	20.83	9.49	30.32	46.00	-15.68	Average
6	1.418	31.79	9.49	41.28	56.00	-14.72	QP
7	1.670	20.38	9.54	29.92	46.00	-16.08	Average
8	1.670	31.05	9.54	40.59	56.00	-15.41	QP
9	10.221	18.82	9.68	28.50	50.00	-21.50	Average
10	10.221	28.41	9.68	38.09	60.00	-21.91	QP
11	13.565	21.17	9.81	30.98	50.00	-19.02	Average
12	13.565	29.95	9.81	39.76	60.00	-20.24	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

Fax: +86-755-28230886

E-mail: info@uttlab.com

<http://www.uttlab.com>

UTTR-EMC-FCCPART15B-V1.0

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix for EUT external and internal photographs.

***** End of Report *****

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
